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Tuna Newsletter

National Marine Fisheries Service
- Southwest Region
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U.S. TUNA STATISTICS

Editor's note: The following articles were prepared by NMFS personnel from data and information gathered from sources in the U.S. tuna industry and government.

U.S. CANNED TUNA INDUSTRY HIGHLIGHTS, THIRD QUARTER 1994

Total receipts of tuna by U.S. canners during the third quarter of 1994 (July-September) decreased by 5% to the equivalent of 114,400 short tons (st) of whole fish (round weight), compared to the third quarter of 1993 (Table 1). The principal species received was skipjack tuna with 50% of the total, followed by yellowfin tuna and albacore, with 27% and 23% of the total, respectively. Yellowfin tuna receipts were up by 25%, while albacore and skipjack tuna receipts were down by 5% and 15%, respectively.

Receipts of tuna for the first three quarters of 1994 totaled 327,500 st, a 1% decrease from the previous year (Table 2). Yellowfin tuna and albacore receipts were up by 22% and 8%, respectively, while skipjack tuna receipts were down by 13%.

Although the vast majority of tuna received by U.S. canners is whole fish, some quantity is received as loins or gilled-and-gutted. Receipts of tuna loins for the third quarter of 1994 were down 5%, while receipts of loins for the first three quarters of the year were up by 27%. (The round weight totals used above were approximated by converting weights of loins and gilled-and-gutted receipts by factors of 2.25 and 1.11, respectively. For the remainder of

Table 1. Total U.S. cannery receipts (st) by species for the third quarters of 1993 and 1994. Totals may not add due to rounding.

Jul-Sep	Type	Albacore	Skipjack	Yellowfin[1]	TOTAL
1993	ROUND	27,000	55,900	19,500	102,400
	GILLED & GUTTED	0	0	500	500
	LOIN	300	5,200	2,000	7,600
	TOTAL (as received)	27,300	61,100	22,000	110,400
	TOTAL (estimated round wt)[2]	27,700	67,700	24,600	119,900
1994	ROUND	26,000	46,200	25,600	97,800
	GILLED & GUTTED	0	0	300	300
	LOIN	100	5,000	2,200	7,200
	TOTAL (as received)	26,100	51,200	28,100	105,400
	TOTAL (estimated round wt)[2]	26,200	57,400	30,800	114,400

[1]May include a small amount of bigeye tuna.

[2]Converted to round weight by using factors of 1.11 for gilled-and-gutted and 2.25 for loins.

Table 2. Total U.S. cannery receipts (st) by species for the first three quarters of 1993 and 1994. Totals may not add due to rounding.

Jan-Sep	Type	Albacore	Skipjack	Yellowfin[1]	TOTAL
1993	ROUND	70,300	163,700	58,600	292,700
	GILLED & GUTTED	0	0	1,900	1,900
	LOIN	700	11,600	4,300	16,600
	TOTAL (as received)	71,000	175,300	64,800	311,200
	TOTAL (estimated round wt)[2]	71,900	189,800	70,400	332,100
1994	ROUND	77,500	137,700	64,200	279,400
	GILLED & GUTTED	0	0	800	800
	LOIN	100	11,800	9,100	21,000
	TOTAL (as received)	77,600	149,400	74,100	301,200
	TOTAL (estimated round wt)[2]	77,800	164,200	85,600	327,500

[1]May include a small amount of bigeye tuna.

[2]Converted to round weight by using factors of 1.11 for gilled-and-gutted and 2.25 for loins.

Table 3. U.S. cannery receipts (st) of domestic and imported tuna by species for the third quarters of 1993, 1994 and the recent (1989-93) third quarter averages. Totals may not add due to rounding.

Jul-Sep	Source	Albacore	Skipjack	Yellowfin[1]	TOTAL
		AMERICAN SAMOA & CALIFORNIA			
1993	DOMESTIC	3,000	37,600	10,700	51,300
	IMPORTED	9,400	4,900	2,400	16,700
	TOTAL	12,400	42,500	13,100	68,000
1994	DOMESTIC	1,600	20,100	15,500	37,100
	IMPORTED	10,800	7,100	2,200	20,100
	TOTAL	12,400	27,200	17,700	57,300
1989-93 Average	DOMESTIC	1,700	27,200	10,200	39,100
	IMPORTED	9,400	6,800	2,700	18,900
	TOTAL	11,100	33,900	12,900	58,000
		PUERTO RICO			
1993	DOMESTIC	0	10,900	5,100	16,000
	IMPORTED	14,900	7,700	3,800	26,400
	TOTAL	14,900	18,700	8,900	42,400
1994	DOMESTIC	2,600	14,100	6,100	22,700
	IMPORTED	11,100	9,900	4,300	25,400
	TOTAL	13,700	24,000	10,400	48,100
1989-93 Average	DOMESTIC	100	10,800	6,900	17,700
	IMPORTED	12,700	13,100	7,800	33,600
	TOTAL	12,800	23,900	14,700	51,400
		TOTAL			
1993	DOMESTIC	3,000	48,500	15,800	67,400
	IMPORTED	24,200	12,600	6,200	43,100
	TOTAL	27,300	61,100	22,000	110,400
1994	DOMESTIC	4,100	34,200	21,600	59,900
	IMPORTED	22,000	17,000	6,500	45,500
	TOTAL	26,100	51,200	28,100	105,400
1989-93 Average	DOMESTIC	1,800	37,900	17,100	56,800
	IMPORTED	22,200	19,900	10,500	52,500
	TOTAL	23,900	57,800	27,600	109,300

[1]May include a small amount of bigeye tuna.

this article, unconverted receipts are used unless otherwise stated.)

Receipts of tuna by U.S. canners in American Samoa and California for the third quarter of 1994 were down by 16%, compared to the third quarter of 1993, due to a large decrease in skipjack tuna receipts (Table 3). Total receipts in Puerto Rico were up by 13%, with increases in skipjack and yellowfin tuna receipts more than offsetting a slight decrease in albacore receipts.

Domestic deliveries to U.S. canners for the first three quarters of 1994 decreased by 14%, while imported deliveries increased by 10% (Table 4). Skipjack tuna was easily the largest component of all domestic deliveries at 100,900 st, followed by yellowfin tuna, 39,700 st, and albacore, 4,900 st. Domestic deliveries accounted for 48% of the tuna delivered to U.S. canners.

Albacore was the leading import for the third quarter of 1994 at 22,000 st, followed by skipjack and yellowfin tuna at 17,000 st and 6,500 st, respectively (Table 5). The leading non-U.S. supplier was Taiwan, with 35% of the import market, followed by Vanuatu and Japan, with 14% and 9% of the market, respectively. The western Pacific Ocean was the main source of all three important tuna species (Table 6): skipjack tuna (38,700 st), yellowfin tuna (19,000 st) and albacore (11,800 st).

Contract prices for domestically caught tuna delivered to U.S. canners in the third quarter of 1994, normally announced by the American Tuna Sales Association, were not available at press time. It has been reported that one major canner no longer intends to negotiate a monthly price with the ATSA, but will buy fish on a "spot" or load basis with prices negotiated accordingly. Another canner has continued to negotiate prices through the ATSA with its contract boats, but the ATSA will not announce these prices.

Table 4. U.S. cannery receipts (st) of domestic and imported tuna by species for the first three quarters of 1993, 1994 and the recent (1989-93) averages. Totals may not add due to rounding.

Jan-Sep	Source	Albacore	Skipjack	Yellowfin[1]	TOTAL
1993	DOMESTIC	4,900	126,100	38,600	169,600
	IMPORTED	66,200	49,300	26,200	141,600
	TOTAL	71,000	175,300	64,800	311,200
1994	DOMESTIC	4,900	100,900	39,700	145,500
	IMPORTED	72,700	48,600	34,400	155,700
	TOTAL	77,600	149,400	74,100	301,200
1989-93 Average	DOMESTIC	5,200	96,700	53,400	155,300
	IMPORTED	66,900	71,900	39,300	178,100
	TOTAL	72,100	168,600	92,600	333,400

[1]May include a small amount of bigeye tuna.

Table 5. U.S. cannery imports (st) of tuna by species and source (flag of catcher vessel) for the third quarter of 1994. Totals for the third quarter of 1993 are given for comparison. Note that the flag of the catcher vessel does not necessarily reflect the country of export or point of shipment. Totals may not add due to rounding.

VESSEL FLAG	1994				1993
	Albacore	Skipjack	Yellowfin[1]	TOTAL	TOTAL
BRAZIL	0	500	0	500	0
ECUADOR	0	200	600	800	300
FRANCE	200	500	200	900	4,500
GHANA	0	2,700	100	2,800	800
JAPAN	4,300	0	*	4,300	3,100
NEW ZEALAND	200	600	0	700	300
PANAMA	600	700	600	1,800	400
SOLOMON ISLANDS	0	600	100	700	0
SOUTH AFRICA	1,900	0	0	1,900	1,800
SOUTH KOREA	300	2,800	400	3,400	1,900
SPAIN	*	900	1,000	1,900	900
TAIWAN	14,100	1,200	400	15,700	19,500
VANUATU	0	3,900	2,500	6,500	2,500
UNKNOWN	100	1,300	200	1,600	2,800
OTHER	400	1,000	500	2,000	4,400
TOTAL	22,000	17,000	6,500	45,500	43,100

*Less than 100 st reported for this category.

[1]May include a small amount of bigeye tuna.

U.S. imports of canned tuna packed in water totaled 30,800 st for the third quarter of 1994, down 11% from 1993. For the first nine months of 1994, imports of canned tuna stood at 109,100 st, up 23% from the previous year.

U.S. TUNA FISHERIES UPDATE

EASTERN PACIFIC TROPICAL TUNA FISHERY

In 1994, 12 U.S. tuna purse seiners participated in the eastern tropical Pacific tuna fishery and caught an estimated 12,700 metric tons (mt) of yellowfin tuna and 11,500 mt of skipjack tuna (Figure 1). The yellowfin tuna catch was down 36% from the 1993 catch (19,700 mt), and the skipjack tuna catch was down 35% from the 1993 catch (17,800 mt). The fleet continues to be affected by "dolphin safe" policies and concentrated its effort on tunas not associated with dolphins. The 1994 U.S. allowable quota of 114 dolphin mortalities, established by the U.S. International Dolphin Conservation Act, was reached on February 7. Since then, the taking of dolphins by U.S. tuna purse seiners in the eastern tropical Pacific was prohibited for the remainder of the year.

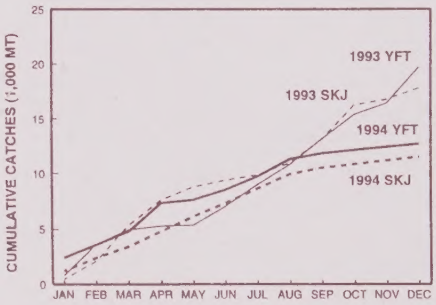


Figure 1. Cumulative tuna catches, by month, for the U.S. eastern Pacific purse seine fishery, 1993 and 1994.

WESTERN PACIFIC TROPICAL TUNA FISHERY

For the period January through June 1994, 40 U.S. tuna purse seiners registered to fish in the western tropical Pacific under the South Pacific Tuna Treaty landed an estimated 67,400 mt of skipjack tuna and 13,700 mt of yellowfin and bigeye tuna (Figure 2). The skipjack tuna landings were down 1% from the 1993 landings for the same pe-

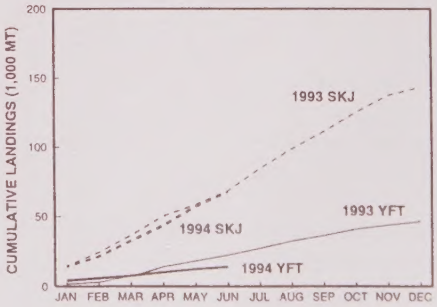


Figure 2. Cumulative tuna landings, by month, for the U.S. western tropical Pacific purse seine fishery, 1993 and 1994.

Table 6. Receipts (st) of tuna by U.S. canneries by species and area of capture for the third quarters of 1993 and 1994. Totals may not add due to rounding.

SOURCE	Albacore		Skipjack		Yellowfin[1]	
	1993	1994	1993	1994	1993	1994
E. ATLANTIC OCEAN						
DOMESTIC	0	0	0	0	0	0
IMPORTED	7,300	3,800	2,300	7,400	1,200	2,700
TOTAL	7,300	3,800	2,300	7,400	1,200	2,700
W. ATLANTIC OCEAN						
DOMESTIC	0	0	0	100	0	*
IMPORTED	4,600	3,500	0	700	100	*
TOTAL	4,600	3,500	0	800	100	*
E. PACIFIC OCEAN						
DOMESTIC	3,000	3,600	3,100	2,600	2,600	4,200
IMPORTED	0	300	1,100	1,300	900	1,700
TOTAL	3,000	3,900	4,200	3,900	3,500	5,900
W. PACIFIC OCEAN						
DOMESTIC	100	500	45,400	31,500	13,200	17,300
IMPORTED	10,700	11,200	5,700	7,100	3,200	1,700
TOTAL	10,800	11,800	51,100	38,700	16,400	19,000
INDIAN OCEAN						
DOMESTIC	0	0	0	0	0	0
IMPORTED	1,700	3,100	3,600	500	800	400
TOTAL	1,700	3,100	3,600	500	800	400

*Less than 100 st reported for this category.

[1]May include a small amount of bigeye tuna.

Table 7. U.S. commercial landings of Atlantic bluefin tuna for 1994.

Category	# of Fish	Avg. Wt. (lbs.)	Gross Wt. (mt)	Quota (mt)
GENERAL	3,858	367	642	531
Handline	1,366	380	235	
Rod & Reel	2,442	360	398	
Harpoon	50	381	9	
HARPOON	359	362	59	53
INCIDENTAL	435	493	97	113
N. Longline	162	395	29	23
S. Longline	257	566	66	86
Other	16	312	2	4
PURSE SEINE	1,705	389	301	301
TOTAL	6,357	381	1,099	998

riod (68,200 mt), and the combined yellowfin and bigeye tuna landings were down 39% (from 22,500 mt). *(Report provided by Doug Prescott, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

NORTHERN PACIFIC ALBACORE FISHERY

The 1994 U.S. north Pacific albacore troll season began in May and extended into early November and resulted in the highest catch of albacore in the past ten years. The preliminary estimate of the total catch by the U.S. fleet is approximately 9,300 metric tons, an increase of nearly 50% from the 1993 catch. The larger, long-distance vessels made high catches in May and June northwest of Midway Island, fishing near the international date line. Fish caught in these areas averaged between 9 and 11 kg in weight, larger than usual for this fishery. As the summer progressed, vessels moved east and again found good catches between 140° and 150° west longitude and 39° to 45° north latitude. Vessels in this offshore area caught up to 900 fish per day at the height of the season. Albacore fishing near the U.S. west coast was also exceptionally productive. Vessels did not have to go far, with some catches made as close as 15 to 20 miles from shore. Four NMFS biologists collected fishing information for the Southwest Fisheries Science Center from aboard U.S. troll vessels. *(Report provided by John Childers, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

SOUTHERN PACIFIC ALBACORE FISHERY

The 1994-95 U.S. south Pacific albacore fishery got underway in late December. Approximately 10 to 15 U.S. vessels will participate in the fishery, about the same number as in the previous season but well below the 40 vessels that participated in the 1992-93 season. The low number of vessels fishing in the south Pacific this season is due, in part, to recently publicized indications of *El Niño* conditions in the equatorial regions of the central Pacific. Unusually warm surface waters in the southern Pacific albacore fishing grounds also adversely affected the participation of U.S. troll vessels in the fishery last season. *(Report provided by John Childers, NMFS Southwest Fisheries Science Center, La Jolla, CA)*

WESTERN ATLANTIC BLUEFIN TUNA FISHERY

New quotas for bluefin tuna in the western Atlantic were established during the Ninth Special Meeting of the International Commission for the Conservation of Atlantic Tunas. The total catch for the region will be 2,200 mt in 1995 and in 1996. Of this quota, the United States will be allowed to harvest 1,311.4 mt, Canada 535.6 mt and Japan 353 mt. A plan was also developed for sharing future increases or decreases in quota. The present assessment indicates that year classes born since 1983 may be more abundant than previously indicated. Additionally, there is uncertainty about the effects of mixing of stocks between the eastern and western Atlantic. The Standing Committee on Research and Statistics (SCRS) concluded on the basis of this assessment that it was not necessary to reduce catches to 1,200 mt in 1995 as previously expected. Nor did the SCRS recommend any increase in the quota, and the Chairman of the SCRS urged that the more optimistic 1994 assessment be interpreted with utmost caution.

The Commission agreed to a proposal by the three countries fishing for bluefin tuna in the western Atlantic to set the quota at 2,200 mt for 1995 and 1996. It was agreed that any increase in quota up to 2,660 mt (an amount equal to the 1991 quota level) would be shared according to the same percentages of the current 1995-96 quota. Since Japan had taken the major reduction in quota in 1994, if the quota returns to 1991 levels, then Japan will get its traditional share back, i.e., 26.32%. The United States would get 52.14% and Canada 21.54%. Catches by the United States and Canada may not increase over their 1991 levels until Japan's historic catch percentage is restored. A summary of U.S. Atlantic bluefin tuna landings for all commercial categories for 1994 is given in Table 7. *(Report provided by Kevin B. Foster, NMFS Northeast Region, Gloucester, MA)*

REPORTS

Editor's note: Original reports are published as a service to subscribers and may not represent the views of the NMFS. Readers should contact the authors of reports for details, if needed.

SUMMARY OF THE STATUS OF THE NORTH PACIFIC ALBACORE POPULATION FROM THE THIRTEENTH NORTH PACIFIC ALBACORE WORKSHOP, DECEMBER 1993

Norman Bartoo, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, CA 92038-0271

The Thirteenth North Pacific Albacore Workshop was held at the Southwest Fisheries Science Center (SWFSC), La Jolla, California. The workshop was attended by 17 participants from 5 countries. Thirty working papers were presented and discussed. A key portion of the workshop was dedicated to evaluating the status of the North Pacific albacore population (assumed here to be a single stock). The entire discussion section from the workshop report is included here for completeness.

The participants reviewed several working papers which dealt with the status of the North Pacific albacore population. Basic trends in nominal and standardized catch per unit of effort (CPUE) in the major North Pacific albacore surface and subsurface fisheries were examined. Maximum sustainable yield (MSY), relative fishing mortality and biomass removal estimates were presented, and forecasts of albacore biomass recovery times (relative to MSY) under differing catch scenarios were presented.

Trends in CPUE

Trends in CPUE for the Japanese longline, pole-and-line, purse seine, and large-mesh driftnet fisheries and the U.S. troll fishery were standardized using Generalized Linear Models (GLM). Trends in CPUE for the Korean and U.S. longline (Hawaii-based) fisheries were documented based on derivatives of nominal effort. Descriptions of CPUE trends for each of the fisheries discussed at the workshop follow.

Standardized CPUEs were developed for young (≤90 cm FL) and adult (>90 cm FL) albacore in the Japanese longline fishery from 1973 to 1991. For young albacore, CPUEs were variable and high from 1976 to 1980 except for 1978, decreased from 1981 to 1988 and have since been steadily increasing. For adult albacore, CPUEs were relatively stable from 1973 to 1980, increased in 1981, before declining to previous levels.

Standardized Japanese pole-and-line CPUEs were developed for two areas, north of 35°N and south of 35°N from 1972 to 1991. Catch in the northern area is generally composed of younger fish (≤80 cm FL) while catch in the southern area is generally composed of adult fish (>80 cm FL). CPUEs in younger fish decreased from 1972 to 1977, increased in 1978 and remained at high levels through 1980. Since 1980, CPUEs have decreased and remained relatively constant, although one high peak in CPUE was observed in 1990. CPUEs in older fish declined steadily from 1972 to 1991. The decline was more pronounced between 1972 and 1983.

Standardized CPUEs in the Japanese purse seine fishery remained relatively constant during the 1970s and generally increased from 1980 to 1992. The increasing trend in CPUE likely results from changes in fishing strategy and is not indicative of changes in albacore abundance.

Standardized CPUEs for the Japanese large-mesh driftnet fishery span the years 1977 to 1991. Albacore CPUEs increased from 1977 to 1981 and remained relatively stable from 1981 to 1988 before declining. CPUEs from the earlier years may not necessarily reflect the abundance in albacore stocks, due to rapid expansions in fishing areas.

Nominal CPUEs for the Korean longline fishery were developed from 1972 to 1992 for four areas, temperate North (25-45°N) and South (25-45°S) Pacific, and equatorial-tropical North (0-24°N) and South (0-24°S) Pacific. Albacore CPUEs in the equatorial-tropical North Pacific have remained relatively constant from 1975 through 1992, but at low levels compared with other geographical areas. In the equatorial-tropical South Pacific, CPUEs increased from 1975 to 1978, thereafter exhibiting a declining trend until 1990. In the temperate North and South Pacific, CPUEs were consistently greater than tropical areas. CPUEs from temperate regions remained relatively constant throughout the time series, with large interannual variability. Korean longline fishing in both the temperate North and South Pacific ceased in 1990. Korean fishing subsequently has been concentrated in equatorial and tropical waters.

Standardized indices of CPUE were developed for the U.S. troll fishery from 1961 to 1992. Albacore CPUEs decreased from 1961 to 1980 and have since remained at a relatively constant but low level (35 fish/day).

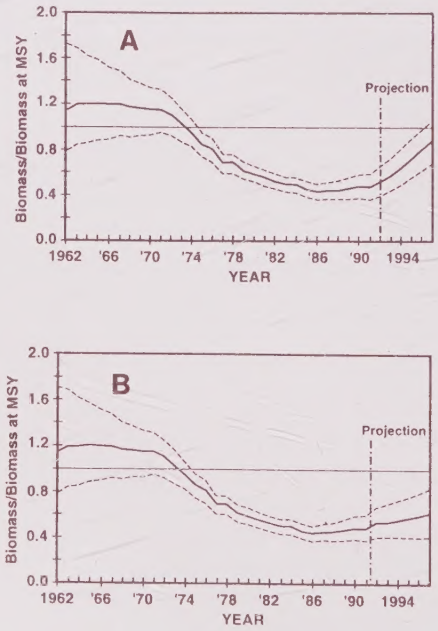
For the Hawaii longline fishery, indices of nominal CPUE were developed from 1959 to 1991, although data are incomplete during 1979-1986 and during 1989-1990. CPUEs steadily increased throughout the time series, but are likely confounded with changes in fishing areas and fleet characteristics, especially since 1987.

Production Model Analysis

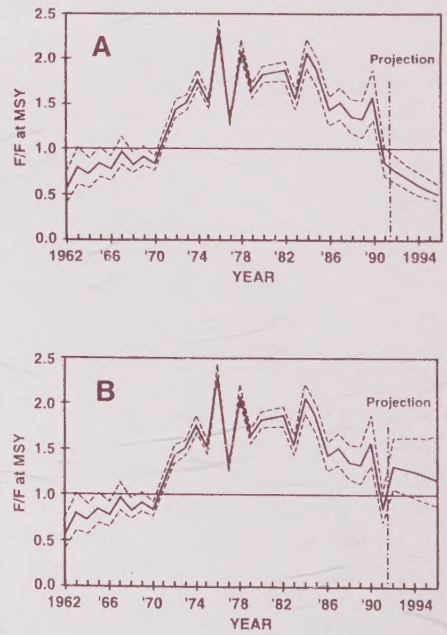
A non-equilibrium production model analysis was conducted using the ASPIC program. Aside from assuming non-equilibrium conditions, ASPIC allows estimation of population production parameters using CPUE indices and catch data from different fisheries exploiting a common stock. ASPIC also provides forecasts of relative biomass (ratio of biomass to the biomass at the MSY level) and relative fishing mortality (ratio of fishing mortality to the fishing mortality at the MSY level) based on a presumed level of constant removals (catch).

Input to the model included CPUE time series from the Japanese pole-and-line, longline, and large-mesh driftnet fisheries and the U.S. troll fishery. In addition to these fisheries, updated Korean and Taiwan longline and driftnet (squid and large-mesh) catch data were incorporated into the model. Relative biomass and fishing mortality trajectories were developed and span the years 1962-1996, the last 4.5 years comprising the forecast. At the workshop, analyses were run assuming two projected catch levels after 1991, 30,000 and 50,000 mt.

Using the model results, MSY was estimated at 71,800 mt with 80% confidence limits ranging from 67,700-79,500 mt. Trajectories of relative biomass and relative fishing mortality for the two projected catch levels are presented in Figures 3 and 4. For both projections, relative biomass trajectories decreased from the beginning of the time series, falling below B_{MSY} in 1974. Relative biomass continued to decrease until 1986 and then increased. The trajectories suggest that the upward trend will continue and that recovery to the B_{MSY} level will occur in the near future. The difference between the two trajecto-



Figures 3A and 3B. Bootstrapped annual relative Biomass (=B/B at MSY) from the ASPIC model for the four CPUE series. Dotted lines show upper and lower 80% confidence interval based on 500 trials. For Figure 3A, a catch of 30,000 metric tons was used in the projection; for Figure 3B, a catch of 50,000 metric tons was used.



Figures 4A and 4B. Bootstrapped annual relative fishing mortality (=F/F at MSY) from the ASPIC model for the four CPUE series. Dotted lines show upper and lower 80% confidence interval based on 500 trials. For Figure 4A, a catch of 30,000 metric tons was used in the projection; for Figure 4B, a catch of 50,000 metric tons was used.

ries is the time at which B_{MSY} is reached, the 30,000 mt projected catch shows a quicker recovery compared with the 50,000 mt annual catch (Figures 3A and 3B).

The trajectories of relative fishing mortality continued to increase from the beginning of the time series and have exceeded F_{MSY} since 1971. The level of relative fishing mortality fluctuated between 1.5 and 2.0 times F_{MSY} during 1975 to 1987. Relative fishing mortality has decreased since 1987 and fell below F_{MSY} in 1991. The trajectory of relative fishing mortality, assuming an annual catch of 30,000 mt, continued to decline below F_{MSY}. Conversely, the trajectory of relative fishing mortality assuming an annual catch of 50,000 mt initially increased to levels above F_{MSY} but suggests that relative fishing mortality would decline towards F_{MSY} (Figures 4A and 4B).

The participants recognized there are differences in age composition among the CPUE series used in the model, but the production model does not account for these differences and the results presented may not be representative of the relative abundance of adult albacore. Therefore, it is strongly recommended that factors affecting CPUE indices be identified and compared with the results from age structured models at future workshops.

Interpretation

Some apparent contradictions in the results presented at the meeting make it difficult to arrive at a reliable conclusion about the status of albacore stocks. The production model results imply that the albacore stock in the North Pacific has been heavily exploited and at times overexploited during the last two decades. The tagging results, on the other hand, show an average exploitation rate of 0.23. The normal rule of thumb is that an exploitation rate less than 0.5 is less than optimally exploited. The relatively stable stock abundance during the last several years shown by the production model is echoed by some of the CPUE trajectories, but at least one CPUE trajectory with effect of various variables removed with a GAM model showed a continuing decline. The increasing trend in catchability shown by the tag analysis, as well as unaccounted changes in fleet characteristics and fishing areas, indicate two ways that a downward trend in abundance could be absent from a calculated CPUE trend. It should be born in mind that any trends in abundance could be caused by long-term environmental fluctuations rather than solely by the fisheries.

These apparent contradictions may be the result of built-in assumptions of the various analytical models used. Further work should be conducted to resolve the differences. The approach might be to examine the sensitivity of the models to their assumptions and by analysis of the data with other models. Although there are uncertainties about the condition of the stock, the continuing decline in fishing effort means that the stock should not decline due to fishing pressure in the near future.

An abstract from a recently published paper written by a SWFSC scientist is presented in this space to announce its availability and to report results of tuna research conducted by Center staff.

RECENT SWFSC PUBLICATION: "VERTICAL AND ONSHORE-OFFSHORE DISTRIBUTIONAL PATTERNS OF TUNA LARVAE IN RELATION TO PHYSICAL HABITAT FEATURES"

Boehlert, G. W., and B. C. Mundy. 1994. Marine Ecology, Progress Series. 107:1-13.

The seasonal and spatial distributions of larval scombrids in waters off Oahu, Hawaii, were studied in September and December 1985 and April and June 1986 to determine vertical and onshore-offshore patterns. Horizontal distribution was resolved by sampling transects of three stations on the windward (east; 3.7, 9.3, and 27.8 km offshore) and leeward (west; 1.8, 9.3, and 27.8 km offshore) sides of the island. Vertical distribution was resolved by sampling with MOCNESS and Manta nets in eight depth strata (0-80 m) at the two nearshore stations and nine depth strata (0-200 m) at the four offshore stations.

Scombrid larvae were abundant in all months except December. Collections in September and June were dominated by *Thunnus* spp.; about half were large enough to be identified to species and were predominantly *T. albacares*. *Thunnus* spp. generally were most abundant closest to shore on the leeward side of the island. Larval *Thunnus* were not taken at 60 m, were most abundant in the upper 20 m, and were captured in the neuston at night but rarely in daytime. The other two dominant larval scombrids, *Katsuwonus pelamis* and *Auxis* spp., were most abundant in slightly deeper water. *Katsuwonus pelamis* were most abundant at offshore stations, but *Auxis* spp. showed no clear onshore-offshore pattern. In April, *Auxis* spp. were most abundant and comprised over 99% of all larval scombrids.

Diel vertical distribution patterns were not consistent between cruises or sides of the island for any species studied. No evidence was found for diel migratory behavior. The physical structure of the water column, particularly temperature and salinity, altered the spatial and temporal distribution patterns of larvae on short time and space scales and also on the seasonal scale. Seasonal patterns of spawning were likely dependent upon availability of appropriate thermal habitat. Larval *Thunnus* and *Katsuwonus*, in particular, were abundant only when temperatures were relatively warm.

Auxis larvae were found over a wider range of temperature than were the other genera. We suggest that the high concentrations of scombrid larvae near islands, particularly *Thunnus* spp., may be related to habitat characteristics that promote higher larval survival than in oceanic waters.

RECENT DEVELOPMENTS IN TUNA FISHERIES

Editor's note: The following news items, compiled from fishery trade and industry journals, newspapers and NMFS reports, are provided only as a service to our readers. The NMFS does not guarantee their accuracy.

UNITED STATES

NMFS Closes East Coast Door-- The NMFS announced that it would propose a new control date for Atlantic tunas, effectively closing the fishery to any commercial boats not already in it as of September 1, 1994. Access to tuna in the Atlantic, Caribbean and Gulf of Mexico could be limited; the control date is a first step. NMFS officials say the announcement was intended to "discourage new entries to the fisheries based on economic speculation" while the government decides what permanent restrictions should be imposed. The September 1 control date for commercial boats covers not just the high-priced bluefin tuna but also albacore, yellowfin, bigeye and skipjack tunas. The announcement came just two weeks before NMFS opened a series of public meetings on Atlantic shark and tuna management. It is anticipated that yellowfin tuna will be the next big conservation target, since the International Commission for the Conservation of Atlantic Tunas identified yellowfin as a fully exploited species in 1993. (*National Fisherman*, December 1994)

WESTERN PACIFIC

Marshall Islands Tuna Exports Predicted-- The Marshall Islands Development Authority predicts that a tuna export industry is viable there based on the January-June 1994 longliner catches. Tuna landings during that period totaled 855 mt, more than double the total for all of 1993. Of the total, the 50 Chinese-owned boats landed 765 mt, while the 10 locally-owned boats landed 90 mt. (INFOFISH *Trade News*, November 15, 1994)

New Philippine Fishing Port-- A 25-hectare fishing port, storage and processing facility based in General Santos, Philippines, is expected to be completed for tuna processing within the next two years. The facility will have a landing quay for small to medium boats, a wharf for 2,000 mt reefer carriers, a 1,500 mt cold store facility for tuna, freezers and a 60 mt/day ice plant. Additionally, a 10-hectare site is being made available for tuna canners and processors--a boon for local ships which at present have to send tuna to canneries in Thailand. With the opening of this facility, the country is expected to increase its presence in tuna processing in the region. (INFOFISH *Trade News*, December 1, 1994)

Vietnam to Develop Tuna Industry-- The Foreign Ministry of Vietnam has plans to encourage tuna fishing to further develop its domestic fishing industry. Some 10 skipjack tuna pole-and-line vessels will be built with loans obtained from Malaysia and Indonesia, while 40 yellowfin/bigeye tuna longliners will be bought using private sector loans from Taiwan. The skipjack tuna will be sent to canners, and the yellowfin and bigeye tuna will be exported to Japan for the sashimi market. (INFOFISH *Trade News*, December 1, 1994)

New Japanese Skipjack Pole-and-Line Vessels-- The first of three new "low-cost" distant-water Japanese skipjack tuna pole-and-line vessels was launched in November 1994. Constructed for the Mie Prefecture Tuna/Skipjack Cooperative by the Miho Shipbuilding Company of Shizuoka Prefecture, these vessels will replace the aging, 39-vessel Japanese distant-water pole-and-line fleet. Construction costs were reduced significantly by ordering them as a group using the same vessel design. Miho can reportedly cut costs by $1 million per vessel (new pole-and-line vessels usually cost over $10 million), by saving on labor costs associated with vessel design and construction. Constructing new, low-cost fishing vessels has become a major objective for Japanese distant-water fishing companies which are attempting to compete with Asian competitors in less-developed countries where labor costs are lower. All three vessels have 499 gross registered tons and are scheduled to be completed by February 1995. (NMFS from *Nikkan Suisan Keizai Shimbun*, November 16, 1994)

UPCOMING TUNA MEETINGS

(Organizer; meeting type: sci=science, adm=administration)

- MAR 14-16. Annual U.S.-Forum Fisheries Agency South Pacific Tuna Treaty Consultation. Nadi, Fiji. (FFA; adm)
- APR 10-16. 14th North Pacific Albacore Workshop. Taipei, Taiwan. (Institute of Oceanography, National Taiwan University; sci)
- May 14-17. 46th Tuna Conference. Lake Arrowhead, CA. (IATTC & NMFS; sci).
- JUN 13-15. Annual Meeting of the Inter-American Tropical Tuna Commission. La Jolla, CA. (IATTC; adm)

Nauru-Japan Fisheries Agreement--The Pacific Island nation of Nauru has come to an agreement with Japan on terms of fishing access. A per vessel, per trip entry fee will be in effect for a minimum of three years. For the first year, the fee will be $5,100 for tuna longliners of sizes less than 100 mt, $6,200 for longliners larger than 100 mt, $4,000 for skipjack pole-and-line vessels and $10,100 for *kaikami* purse seiners. (INFOFISH *Trade News*, December 1, 1994)

French Pacific Waters Reopened to Japan--The waters of the French Overseas Territories of New Caledonia, Wallis and Futuna have reopened for Japanese tuna vessels after a period of two years. Effective August 1994, the agreement allows Japanese fishing in the 200-mile zones, with a maximum of 36 vessels allowed in New Caledonian waters and 3 in the waters of Wallis and Futuna. A total catch quota of 3,000 mt is to be divided: New Caledonia (2,500 mt) and Wallis and Futuna (500 mt). Entry fees for these vessels for New Caledonia and Wallis and Futuna were fixed at $850,000 and $73,000, respectively. (INFOFISH *Trade News*, December 1, 1994)

Kiribati-Japan Agreement--Japan and the Pacific island nation of Kiribati have reached agreement on Japanese tuna fishing in Kiribati waters during the 1994-95 fishing season. The negotiations, conducted in Suva, Fiji, from November 21-23, 1994, produced an agreement with provisions the same as those reached for the 1993-94 season. Japanese longliners and pole-and-liners will pay a per-trip access fee equal to 5 percent of the total catch value; Japanese purse seiners will pay an annual access fee of $10,000 per vessel. It was also agreed that Kiribati observers would be permitted to accompany several of the Japanese vessels. In addition, Kiribati officials requested that Japan expand the scope of its joint venture activities in Kiribati. (NMFS from *Nikkan Suisan Keizai Shimbun*, November 28, 1994)

EASTERN ATLANTIC

Namibian Tuna Fleet-- A tuna fleet which did not even exist at the time of Namibian independence in 1990 has added diversity to Namibia's fishing industry. A fleet of some 50 vessels is in operation, including pole-and-line albacore boats, mainly for delivering fish to Puerto Rico canners, and longliners targeting bigeye tuna for the Japanese sashimi market. One tuna cannery at Walvis Bay processes imported skipjack from Ghana and other West African waters for re-export to the European market. (*Fishing News International*, December 1994)

Senegal-EU Fisheries Agreement-- The Senegal-European Union Fisheries Agreement has been renewed to cover a period of two years beginning October 2, 1994. Fishing allowances under the agreement include, among others, tuna pole-and-liners (11 vessels), tuna seiners (47 vessels) and tuna longliners (6 vessels). At least 16,000 mt of tuna are expected to be landed locally per year. In return, the EU will provide financial compensation of $22.8 million shared out as follows: Public Treasury ($20.0 million), fisheries/oceanographic research ($580,000); training ($291,000); fisheries surveillance ($1.1 million); Ministry of Fisheries ($572,200); and artisanal fisheries development ($253,200). (INFOFISH *Trade News*, November 15, 1994)

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